

Regional Tensions

Life in America

- Loss of wealth
- Some pick up in economy due to defense spending
- Job situation improving
- Career dislocation
- Jobs coming back home
- Population more accepting of government involvement
 - taxes higher
 - deficit not a big problem -- can borrow
 - government policies developed to spur U.S. economy
- Re-education is a big business -- government financed
- Aged population -- have time but not money
 - short haul transportation demand
- Some areas of country experience real estate values decline

Regional Tensions

Nature of threat to security

- Conflict on periphery of blocs
 - potentially massive attacks
- War possible between China and Japan/Russo/India blocs
- Threat to oil supply and other critical raw material
 - Israel still a point of contention
- China powerful & unpredictable
 - openly belligerent
 - don't like US
 - Taiwan conflict point
 - China has ICBM
- Anglo world of shared values worth protecting
- Nuclear proliferation
 - Pakistan
 - Iran/Iraq

Regional Tensions

US Strategic goals

- Deal with world situation (not change it)
 - recognize realities of regionalism
- Strategic goals
 - **A.** Contain Chinese Expansion
 - **B.** Recover inter-regional markets
 - **C.** Protect home regions
 - **D.** Assured supply at critical natural resources & energy
 - **E.** Prevent world war.
 - **F.** Unify US society

Regional Tensions

Needs

- **1.** Regional industrial capability (ABCEF)
 - defense hardware (multiplicity of sources)
 - commercial products (reduce costs without using low cost labor)
- **2.** Regain skilled domestic labor force (BCF)
 - engineers/scientists
 - skilled shop labor
- **3.** Rapid, reliable and flexible distribution capability (ABD)
- **4.** Capability to project military force (ACDE)
- **5.** Develop alternative domestic energy sources (BCDE)
- **6.** Reverse stratification of society (CF)
- **7.** Secure communication/IT system (BCF)
- **8.** Global awareness /intelligence(ABCDE)
- **9.** Improvement in transportation infrastructure (BCF)
- **10** Defensive military capability
- **11** Enhance infectious disease defense

Regional Tensions

Opportunities

- Rebuild design/manufacturing/distribution/communication/IT industry base of US (1 2 3 6 7 9)
 - capitalize on infotech and university/industry/government partnership to attain
 - flexible
 - fast to response
 - low cost
 - rapid introduction of new materials
- Reinvigorate US education system/change motivation of work force (1 2 6)
- Dominate built in regional market successfully compete for South America (1 2 3 4 5 7 8 9)
- Develop energy technology (1 5 9)
- Combine long range force projection & transport in same vehicle [defensive commercial transports] (3 4 9)
- .Efficient short range transportation (1 3 4 6 9)
- Limited resources require dual use
 - transport
 - communications
 - global awareness
- Stealth technology
- Missile defense
- Quick, cheap non-human access to space
- Utilize residual infrastructure more efficiently/effectively

Regional Tensions

Aeronautic Opportunities/Innovations/Breakthroughs

- Unstaffed or autonomous ATC -- Navigation, collision avoidance, terminal landing system, weather avoidance
 - system self contained in aircraft
- Quick, cheap, on demand, non-human access to space
 - military -- place assets in space faster then enemy can destroy (surveillance, missile defense, communications, navigation, weather)
 - civil -- communications, navigation, surveillance, weather, mercenary use
 - Aero ops -- air breathing first stage, aircraft like operations
- Virtual Smart Universal Aircraft Factory
 - integrated modeling and simulation vehicle design /manufacturing /maintenance /operations /total system optimization...)
 - produces many variations of basic system
 - easy changes/reconfigurable
 - build to replace attrition or as needed
 - open architecture
 - different sizes and capabilities
 - universal flying qualities
- Uninhabited Aerial Vehicle's
 - surveillance
 - cargo
 - combat
 - communications

Regional Tensions

Aeronautic Opportunities/Innovations/Breakthroughs (cont'd)

- Short to medium haul, infrastructure independent (e.g. minimal landing area, autonomous ATC, bare base) transport aircraft, stealthy
 - military -- multi-role, (e.g. special forces)
 - civil transportation in --
 - South America;
 - short haul dense market;
 - support for dispersed manufacturing locations
- Extremely long range, large, super sonic, transport aircraft
 - military --
 - force projection, precision airdrop
 - civil --
 - high value industrial product distribution
 - passenger transport to make better use of scarce transport infrastructure
- Controlled observable/low noise
 - military -- anti-stealth
 - commercial stealth (defense of civil aircraft reduced observability near airports)
- Skill targeted education system
 - core education
 - followed by targeted training
 - industry is the campus for targeted education
 - Defense Education Act of 2020

Regional Tensions

Top Aeronautic Opportunities /Innovations /Breakthroughs

- Unstaffed or autonomous ATC -- Navigation, collision avoidance, terminal landing system, weather avoidance
 - system self contained in aircraft
- Virtual Smart Universal Aircraft Factory
 - integrated modeling and simulation vehicle design /manufacturing /maintenance /operations /total system optimization...)
 - safe and reliable at system level
 - produces many variations of basic system
 - easy changes/reconfigurable
 - build to replace attrition or as needed
 - open architecture
 - different sizes and capabilities
 - universal flying qualities
- Short to medium haul, infrastructure independent (e.g. minimal landing area, autonomous ATC, bare base) transport aircraft, stealthy
 - military -- multi-role, (e.g. special forces)
 - civil transportation in --
 - South America;
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 - support for dispersed manufacturing locations
- Extremely long range, large, super sonic, transport aircraft
 - military --
 - force projection, precision airdrop
 - civil --
 - high value industrial product distribution
 - passenger transport to make better use of scarce transport infrastructure

Regional Tensions

Second Tier Aeronautic Opportunities /Innovations /Breakthroughs

- Skill targeted education system
 - core education
 - followed by targeted training
 - industry is the campus for targeted education
 - Defense Education Act of 2020
- Uninhabited Aerial Vehicle's
 - surveillance
 - cargo
 - combat
 - communications
- Controlled observable/low noise
 - military -- anti-stealth
 - commercial stealth (defense of civil aircraft reduced observability near airports)
- Quick, cheap, on demand, non-human access to space
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Regional Tensions

Physical/Technology/Systems

- Unstaffed or autonomous ATC -- Navigation, collision avoidance, terminal landing system, weather avoidance
 - system self contained in aircraft
- **Communication, bandwidth, management**
- **Upward communication only**
- **Data management**
- **Reliable, communication**
- **Pilot workload**
- **Shifting paradigm at system level**
- **Component of fully automated total air transportation system**
- **Cooperative ATC**
- **UAV**
- **Robust to non-cooperators**

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 - military -- place assets in space faster than enemy can destroy (surveillance, missile defense, communications, navigation, weather)
 - civil -- communications, navigation, surveillance, weather, mercenary use
 - Aero ops -- air breathing first stage, aircraft like operations
- **New air breathing propulsion options**
 - **Gun launched ram/scram first stage, rocket insertion stage**
 - **Ram accelerator, rocket insertion stage**
 - **Ram accelerate direct to orbit**
- **Any expendable components must be very cheap to manufacture vehicle**
 - Technology to support aircraft like ops**
 - on demand
 - small support/launch staff
 - robust ops

Regional Tensions

Physical/Technology/Systems

- **Virtual Smart Universal Aircraft Factory**
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 - produces many variations of basic system
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 - build to replace attrition or as needed
 - open architecture
 - different sizes and capabilities
 - universal flying qualities
- **Integrated product design**
 - **Concept definition for sales to customer before completing drawings**
 - reduced time in all steps at design
 - **Almost pre-rehearsed manufacturing before design**
 - **New design in 18 months**
 - **Integrated design/manufacturing/certification**
- **Integrated product manufacturing**
 - **Total manufacturing strategy established before design completed**

Challenges:

- **An integrated learning system**
- **Rule based system that supports innovation**
- **More universal tooling**
 - **large integrated structure vs. build up at components**

Regional Tensions

Physical/Technology/Systems

- Uninhabited Aerial Vehicle's
 - surveillance
 - cargo
 - combat
 - communications
- **Allocation of piloting functions/degree of autonomy**
- **Communications links in hostile environment**
- **flexible payloads**
- **Propulsion/Energy for long endurance**
 - **low TSFC**
 - **cheep manufacturing**

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 - South America;
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- **STOL, XSTOL, VTOL**
 - **Integrated propulsion/aerodynamics**
- **Noise**
- **Lower TSFC engines**
- **ATC (see autonomous)**
- **Manufacturing (see factory)**

Regional Tensions

Revolutionary Ideas

- **Drag reduction by flowfield modification for SST**
- **Non fossil fuel based energy sources**
- **Weather modification**
- **Components/subsystems flexible/coherent/concurrent technology exploration and demo paradigm**
- **On/Off stealth**

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